CLAIMS :

1. A late transition metal catalyst system comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure immobilized on a solid support where the catalyst loading is less than 100 micromoles transition metal compound per gram of solid support.

2. The catalyst system of claim 1 wherein said ~~particle~~ solid support comprises silica.

3. The catalyst system of claim 1 wherein the supported catalyst is a homogeneous supported catalyst.

4. The catalyst system of claim 1 wherein the metal complex is a first row metal complex.

5. The catalyst system of claim 1 comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure having conjugated groups on a bridging element in said ligand.

6. A late transition metal catalyst system comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure, an organoaluminum compound, and a solid support.

7. The catalyst system of claim 6 wherein the organoaluminum compound is an alumoxane.

8. The catalyst system of claim 7 wherein the metal complex to alumoxane molar ratio is from about 1:500 to 10:1.

9. The catalyst system of claim 6 wherein the Group 9, 10 or 11 metal complex is represented by the formula:

$$LMX_r$$

wherein L is a bidentate ligand that stabilizes a square planar geometry and charge balances the oxidation state of MX_r; X is independently selected from the group consisting of a halogen, alkoxide, aryloxide, amide, phosphide or other univalent anionic ligand, or two such X are joined to form an anionic chelating ligand;

and r is ~~0, 1, 2 or 3~~.

10. The catalyst system of claim 6 wherein said ~~particle~~ solid support comprises silica.

11. The catalyst system of claim 6 wherein the supported catalyst is a homogeneous supported catalyst.

12. The catalyst system of claim 6 wherein the metal complex is a first row metal complex.

13. A late transition metal catalyst system essentially without residual solvent comprising a Group 9, 10 or 11 metal complex stabilized by a bidentate ligand structure immobilized on a solid support.

14. The catalyst system of claim 13 wherein said ~~particle~~ solid support comprises silica.

15. The catalyst system of claim 13 wherein the supported catalyst is a homogeneous supported catalyst.

16. The catalyst system of claim 13 wherein the metal complex is a first row metal complex.

17. The catalyst system of claim 13 wherein said complex is an ionic catalyst comprising a metal cation and a noncoordinating anion.

18. The catalyst system of claim 17 wherein the noncoordinating anion is ~~tetrakis(perfluorophenyl)boron~~ tetrakis(perfluorophenyl)borate.

19. The catalyst system of claim 17 wherein the ionic catalyst is prepared using an anion ~~ionizing~~ precursor that is a halide salt of Group 13-16 metals or metalloids.

20. The catalyst of claim 17 wherein the metal complex to ionizing anion precursor molar ratio is from about 10:1 to 1:10.

21. The catalyst system of claim 1 wherein said complex is an ionic catalyst comprising a metal cation and a noncoordinating anion.

22. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C_3-C_{20} olefin, C_4-C_{20} cyclic olefin, C_4-C_{20} non-conjugated diolefin, C_8-C_{20} aromatic substituted olefin, C_4-C_{20} gem-substituted olefins, or C_{20}-C_{1000} olefin macromer with the catalyst system of claim 1.

23. The polymerization process of claim 22 comprising conducting said contacting under gas phase polymerization conditions.

24. The polymerization process of claim 23 wherein the reactor temperature is from -100 °C to 150 °C and at a pressure up to 7000 kPa.

25. The polymerization process of claim 24 additionally comprising a scavenging compound.

26. The polymerization process of claim 22 comprising conducting said contacting under slurry polymerization conditions.

27. The polymerization process of claim 26 wherein the reactor temperature is from 0 °C to 150 °C and at a pressure from 0.76 MPa to 4.8 Mpa

28. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C_3-C_{20} olefin, C_4-C_{20} cyclic olefin, C_4-C_{20} non-conjugated diolefin, C_8-C_{20} aromatic substituted olefin, C_4-C_{20} gem-substituted olefins, or C_{20}-C_{1000} olefin macromer with the catalyst system of claim 6.

29. The polymerization process for polymerizing olefinically unsaturated monomers comprising contacting one or more of ethylene, C_3-C_{20} olefin, C_4-C_{20} cyclic olefin, C_4-C_{20} non-conjugated diolefin, C_8-C_{20} aromatic substituted olefin, C_4-C_{20} gem-substituted olefins, or C_{20}-C_{1000} olefin macromer with the catalyst system of claim 13.

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